

**FINAL**

**Quality Assurance Project Plan for Removal Action Oversight  
of the Jorgensen Forge Early Action Area - Removal Action  
Construction QA Plan – Modification No. 1**

Prepared for  
**Rebecca Chu**  
**Office of Environmental Cleanup**  
**USEPA, Region 10**

Prepared by  
**Don Matheny**  
**Office of Environmental Assessment**  
**USEPA, Region 10**

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**QAPP Approvals:**

Rebecca Chu

Rebecca Chu, Remedial Project Manager, USEPA  
Office of Environmental Cleanup

Date: 2.2.16

Donald M. Brown

Donald M. Brown, Region 10 QA Manager, USEPA  
Office of Environmental Assessment

Date: 2/3/2016

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## Introduction

This Quality Assurance Project Plan (QAPP) was developed in accordance with the EPA QA guidance (EPA 240-R-02-009). The sections herein describe the necessary planning elements for the EPA to conduct a Removal Action Oversight of sampling and analytical activities at the Jorgensen Forge Early Action Area.

## A3. Distribution List

The list of project personnel and their respective contact information is provided in Table 1. The documentation generated in support of this split sampling event and their distribution is also indicated.

**Table 1. Project Document Distribution List**

<b>Name Title / Project Role Organization/Affiliation</b>	<b>Address Phone Email</b>	<b>Document Distribution</b>
Rebecca Chu Remedial Project Manager EPA Region 10	1200 Sixth Ave., Suite 900, ECL-120 Seattle, WA 98101, (206) 553-1774 <a href="mailto:Chu.Rebecca@epa.gov">Chu.Rebecca@epa.gov</a>	QAPP (hardcopy & e-copy) Data (validation reports)
Donald M. Brown Regional QA Manager EPA Region 10	1200 Sixth Ave., Suite 900, OEA-140 Seattle, WA 98101, (206) 553-0717 <a href="mailto:Brown.DonaldM@epa.gov">Brown.DonaldM@epa.gov</a>	QAPP (e-copy)
Jennifer Crawford RSCC, Project QA Staff EPA Region 10	1200 Sixth Ave., Suite 900, OEA-140 Seattle, WA 98101, (206) 553-6261 <a href="mailto:Crawford.Jennifer@epa.gov">Crawford.Jennifer@epa.gov</a>	QAPP (e-copy)
Don Matheny Scribe Project Manager, Alternate RSCC EPA Region 10	1200 Sixth Ave., Suite 900, OEA-140 Seattle, WA 98101, (206) 553-2599 <a href="mailto:Matheny.Don@epa.gov">Matheny.Don@epa.gov</a>	QAPP (e-copy)
Gerald Dodo Supervisory Chemist EPA Region 10 Laboratory (MEL)	7411 Beach Drive East Port Orchard WA 98366, (360) 871-8728 <a href="mailto:Dodo.Gerald@epa.gov">Dodo.Gerald@epa.gov</a>	QAPP (e-copy)
Kristen Kerns Field Staff USACE	4735 E Marginal Way South Seattle, WA 98124, (206) 764-3474 <a href="mailto:Kristen.Kerns@usace.army.mil">Kristen.Kerns@usace.army.mil</a>	QAPP (e-copy)
David S. Clark Field Staff USACE	4735 E Marginal Way South Seattle, WA 98124, (206) 316-3998 <a href="mailto:David.S.Clark@usace.army.mil">David.S.Clark@usace.army.mil</a>	QAPP (e-copy)

## Acronyms

CLP	Contract Laboratory Program
COC	Chain of Custody
COR	Contract Officers Representative
CQAP	Construction Quality Assurance Plan
DMP	Data Management Plan
DQO	Data Quality Objective
DW	Dry Weight (reporting basis)
EPA	U.S. Environmental Protection Agency
IDOC	Initial Demonstration of Capability
GPS	Global Positioning System
LCS	Laboratory Control Sample
MEL	EPA Region 10 Manchester Environmental Laboratory
MS	matrix spike
MSD	matrix spike duplicate
MSS	Marine Sampling Systems
NELAC	National Environmental Laboratory Accreditation Conference
OC	Organic Carbon
PCB	Polychlorinated Biphenyl
PRP	Potentially Responsible Party
QA	Quality Assurance
QAM	Quality Assurance Manager
QAPP	Quality Assurance Project Plan
QC	Quality Control
RPD	relative percent difference
RPM	Remedial Project Manager
RSCC	Regional Sample Control Coordinator
RvAL	Removal Action Level
SOP	Standard Operating Procedures
TNI	The NELAC Institute
USEPA	U.S. Environmental Protection Agency
USACE	U.S. Army Corps of Engineers

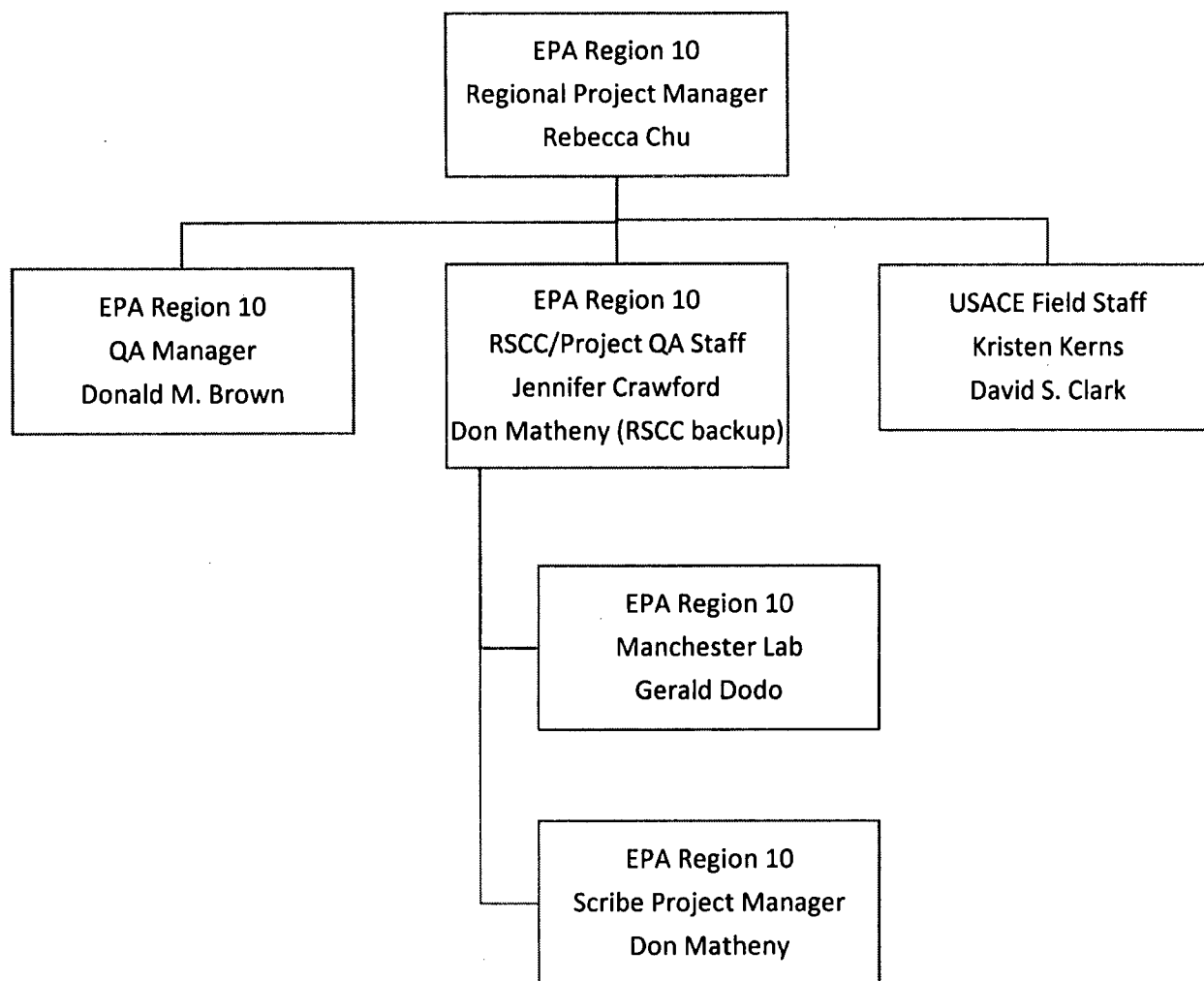
## A4. Project/Task Organization

The project organization and lines of authority for this split sampling event are provided in Figure 1 with the roles and responsibilities shown below in Table 2. The information produced by this project is limited to field observations and laboratory analytical data. While evaluation of the final data is the responsibility of the RPM, other project personnel may be consulted upon to provide a scientific perspective on its technical validity, usability and relevance.

**Table 2. Roles & Responsibilities**

Project Personnel	Responsibility	Authorities
EPA Remedial Project Manager	Coordinates efforts with project support staff and PRPs. Reviews and approves QAPP. Approves analysis of samples, receives & evaluates final data.	QAPP Approval, Primary Agency oversight official
EPA Regional QA Manager	Provides overall QA Program oversight. Delegates QAPP review/approval to EPA Project QA Staff.	Regional QA Program Authority
EPA Regional Sample Control Coordinator (RSCC), Project QA Staff	Schedules EPA lab support services, coordinates sample shipments to labs, resolves issues with lab analyses, and consults on Scribe usage. Provides unique EPA Sample IDs and Regional Project Code. Reviews and approves QAPP. Reviews Scribe submissions for completeness.	COR for EPA Superfund Contract Lab Program (CLP) Authorizes sample shipments to CLP and EPA R10 Labs, Delegated QAPP Approval
EPA Region 10 (MEL) Lab Chemistry Supervisor	Coordinates with lab team leaders on sample analysis, data review and reporting.	Authorizes acceptance of samples into MEL and the release of final reviewed data
USACE Field Staff	Provides oversight of PRP sample collection and processing. Receives split samples from contractor. Transfers custody of samples to designated EPA or MEL staff. Reports observations to EPA RPM.	Delegated oversight responsibilities from EPA RPM
Scribe Project Manager	Data entry or upload into Scribe in accordance with the Region 10 DMP (EPA Region 10, 2014) and QAPP requirements. Coordinates with RSCC for sample shipment notification, prints sample labels, exports electronic COC records to labs and archives Scribe project file.	Overall management of Scribe project file.

**Figure 1. Organization Chart**



## A5. Problem Definition/ Background

Sediment Removal activities conducted at the Jorgensen Forge Early Action Area (within the boundaries of the Lower Duwamish Waterway Superfund Site) resulted in a modification to the Construction Quality Assurance Plan (CQAP) due to the continued presence of contaminated sediments. This modification required additional sampling from the post-dredge, pre-backfill "Z-layer" to further characterize the nature and extent of contamination of sediments located underneath the existing backfill material. As described in the CQAP Modification No. 1 (Anchor QEA, 2015), additional Z-layer sediment samples will

be collected by the Jorgensen Forge contractor (Anchor QEA) to adequately assess compliance with the Jorgensen Forge Early Action Area removal action level (RvAL) of 12 milligrams per kilogram total PCBs (normalized to organic carbon). Sediment sampling will consist of collecting sediment cores representing 7 locations and 3 discrete depth intervals (0-1, 1-2 and 2-3 feet) within the Z-layer.

As part of its responsibility to protect human health and the environment, the EPA is responsible for overseeing cleanup activities for contaminated Superfund sites. The objective of this EPA Superfund Removal Action Oversight project is to independently witness and verify sediment core collection, processing, sub-sampling, collect split sediment samples and if necessary, perform analysis of the splits for PCB Aroclors. It is the intent of this oversight activity to ensure confidence in the integrity and credibility of the PRPs data collection efforts through independent oversight and review. Analysis of splits for PCBs will be at the discretion of the RPM after an evaluation of the PRP PCB data has been conducted or in the event that problems with the PRP lab analysis should arise.

## **A6. Project/ Task Description**

The EPA oversight activities commensurate with this QAPP are as follows:

- Observe coring of the Z-layer sediments
- Observe sediment processing and sub-sampling of the sediment cores
- Collect and store split sediment samples
- Analyze sediments for PCBs and evaluate the results against PRP PCB data

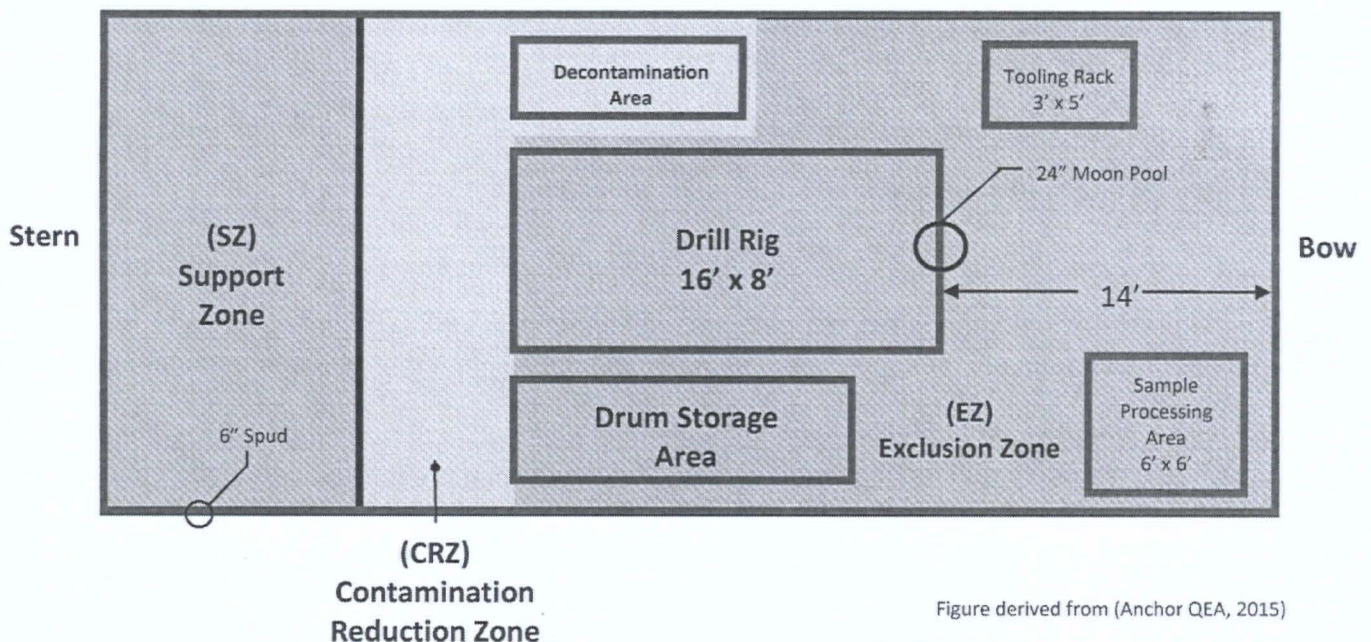
The oversight schedule is dependent upon sample coring activities of Jorgensen's contractor (Anchor QEA). Currently the sediment core collection and processing is scheduled for the week of February 8, 2016. During this time 7 sediment cores are identified for collection from the Z-layer with samples collected at 3 discrete depths (21 samples total). Core sample processing will be conducted on the Marine Sampling Systems (MSS) vessel. Core drilling, processing and sub-sampling will be witnessed by staff from the USACE who are experienced with the procedural requirements. The MSS vessel will be positioned alongside the sonic drilling barge to allow observation of drilling activities, transfer of core samples between the vessels, and communication between the vessels. One observer (Farallon or EPA/USACE) will be accommodated on the drilling barge due to the limited work zone space as seen in Figure 2 (Anchor QEA, 2015).

At the time of sub-sampling the USACE will provide a sample container for filling of split sediments. These split sediments will be placed on ice in a cooler and temporarily stored in a secure freezer located

at the USACE office located in Seattle, WA. Once all the split sediments have been collected, custody of the samples will be transferred to MEL where they will be kept frozen until the approval for analysis of PCB Aroclors and percent moisture has been received from the RPM (estimate within 30 days after receipt). Sample labels and chain of custody forms will be generated by Scribe and provided to the USACE prior to sample collection.

Although the cleanup criteria for this site are evaluated against total PCB Aroclors normalized to total organic carbon (TOC), due to the holding time constraints for TOC analysis, split sediments will only be analyzed for PCB Aroclors (reported to dry weight) and moisture content (for dry weight correction and re-calculation to wet weight values). The evaluation of splits will consist of comparing the EPA PCB values against the original PRP PCB results. Data from this project will be managed by EPA in a Scribe database and archived to Scribe.net at project completion. The sample type will be identified as a "Field Sample-Split" for clarity in the Scribe database.

**Figure 2. Work Zone Areas**



## A7. Quality Objectives and Criteria for Measurement Data

The overall objective for the analysis of PCBs on this project is to provide independent verification of the PRP sediment results for total PCBs in relation to the RvAL of 12 mg/Kg (OC normalized). In support of this objective, data quality objectives (DQOs) and their subsequent data quality indicators and acceptance criteria will be comparable to those used by the PRP contract laboratory. Project quality objectives are provided in Table 3 of the QAPP. The laboratory analysis data quality indicators need to be minimally achieve the project quality objectives. The following is a compilation of the major data quality indicators used to evaluate data quality for this project.

**Precision** is the measure of agreement among repeated measurements of the same property under identical or substantially similar conditions. For this project precision will be measured by the relative percent difference of matrix spike duplicates. The calculation for RPD is given as follows:

$$RPD = \frac{(R_1 - R_2) \times 100\%}{(R_1 + R_2) / 2}$$

RPD = Relative percent difference  
R<sub>1</sub> = Matrix spike result  
R<sub>2</sub> = Matrix spike duplicate result

**Accuracy** is a measure of the overall agreement of a measurement to a known value; includes a combination of random error (precision) and systematic error (bias) components of both sampling and analytical operations. For this project accuracy will be evaluated based on the use of laboratory control samples (LCS), matrix spike(s) and surrogate recoveries. The calculation for percent recovery on matrix spikes and surrogates is given as:

$$\% Rec = \frac{(Sm - N)}{Sa} \times 100\%$$

% Rec = Percent recovery  
Sm = Spike result  
N = Native concentration in the unspiked sample  
Sa = Concentration of Spike Added

For laboratory control samples (LCS) the percent recovery calculation will be determined as follows:

$$\% \text{ Rec} = \frac{Mv}{Tv} \times 100\%$$

$\% \text{ Rec}$  = Percent recovery

$Mv$  = Measured Value in LCS

$Tv$  = True (certified) Value in LCS

**Representativeness** is a qualitative term that expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. For this project split sediments will represent sediment core subsamples that are processed in the same manner as the original samples prepared for the PRP in accordance with the requirements of their approved QAPP. Split samples will be processed and subsampled by the PRPs contract laboratory at the same time that the PRP samples are processed.

**Comparability** is a qualitative term that expresses the measure of confidence that one data set can be compared to another and can be combined for the decision(s) to be made. For this project sample processing, and the methods for extraction and analysis of PCBs and analysis of moisture content will be comparable to those techniques and methods employed by the PRP contract laboratory.

**Sensitivity** is the capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest. For this project the sensitivity for the measurement of PCB Aroclors needs to be sufficiently below the evaluation criteria of 12 mg/Kg (OC) total PCBs that would allow for a quantitative determination of compliance. For this project the reporting limit requirement for total PCBs is set at one half the evaluation criteria with a presumed TOC of 1% (0.06 mg/Kg DW). The reporting limit requirements for the project are provided in Table 3.

**Completeness** is the measure of the amount of valid data needed to be obtained from a measurement system. For this project a completeness objective of 100% valid PCB results is the goal provided the critical nature of the samples. The completeness calculation is given as:

$$\% \text{ Completeness} = \frac{Nv}{Nm} \times 100\%$$

$Nv$  = Number of Valid Measurements

$Nm$  = Total Number of Measurements

## **A8. Special Training Requirements/ Certification**

Field staff will have completed the 40 hour HAZWOPER training as requirement under OSHA 1910.120. MEL has a current TNI accreditation and will have a completed Initial Demonstration of Capability (IDOC) for PCBs prior to commencing with the analysis.

## **A9. Documentation and Records**

Field records will consist of observations noted in a field log maintained by USACE field staff and chain of custody (COC) record documenting sample possession and transfer. Laboratory records consisting of complete supportive raw data documentation will be maintained at the MEL records warehouse until transferred to the federal archiving center. Electronic records of laboratory data and sample identification information will be housed in a Scribe project database and archived to the national Scribe.net data warehouse upon project completion. Both MEL and Scribe records will be referenced against the Regional Project Code provided by the RSCC.

A final technical memorandum containing an evaluation of the PCB split sample results will be written by the RPM for inclusion into the Superfund Site File.

## **Part B - Data Generation and Acquisition**

### **B1. Sampling Process Design (Experimental Design)**

The original sample design is documented in the CQAP Modification No. 1 (Anchor QEA, 2015) for sample locations and representativeness. Table 5 provides the location IDs and their associated GPS coordinates. For this project, samples will represent split sediments from the PRP contractor at the time of processing. All split sediments for PCB Aroclor analysis are of a critical nature. At the discretion of the EPA RPM and in consultation with members of the project team, analysis of the sediment split may not occur until after the PRP contract laboratory has reported their results.

### **B2. Sampling Methods Requirements**

Procedures for collecting sediment core samples is documented in the CQAP Modification No. 1 (Anchor QEA, 2015). At the time of processing EPA sediment split samples will be placed into sample containers by the PRP contractor and witnessed by USACE field staff. Sample containers will be certified clean and provided by the EPA R10 Laboratory. Sample containers, preservation and holding time requirements are found in Table 4.

In the event of catastrophic sample loss due to breakage, the RPM will be contacted by the lab and/or sample custodian to address the issue and seek resolution.

### **B3. Sample Handling and Custody Requirements**

Sample custody is critical to establishing and maintaining the integrity of the split samples. Samples are determined to be in the custody of the designated EPA sample custodian when they are:

- in the physical possession,
- in plain sight,
- secured or locked in a manner that restricts access.

For this project USACE field staff will maintain custody of sample containers before and after filling until they have been transferred to MEL. After filling, the sample caps will be covered with a custody seal and placed in a secured freezer at the USACE office in Seattle. To document sample custody, hardcopy COC forms will be generated and signed by both the USACE field staff and the MEL sample custodian. For sample identification, Regional sample numbers will be assigned from Scribe and printed labels placed onto the sample containers prior to deployment. Sample caps will have the location ID and depth of collection clearly identified. Date and time of sample collection will be hand written onto the labels by the USACE field staff and later entered into Scribe.

At the completion of sample collection, the USACE field staff will transport and hand deliver the samples to MEL. Upon receipt, the MEL sample custodian will log the samples into the laboratory following the lab's custody procedures (EPA Region 10, 2015). Sample identification will be cross referenced against the Scribe COC XML export file (provided to MEL) and hardcopy EPA COC.

### **B4. Analytical Methods Requirements**

The analytical methods, including extraction, for this project are identified in Table 3. These were selected based on the need for comparability with the PRP contract lab and the known capabilities of MEL. QA/QC requirements will follow the prescribed method criteria in addition to MEL SOP requirements (EPA Region 10, 2015). The normal turnaround time for sample analysis and reporting of final reviewed data is 8 weeks.

## **B5. Quality Control Requirements**

Measurement quality control (QC) checks for PCB analysis will consist of instrument, extraction batch and individual sample QC in the laboratory. For every extraction batch, method QC will consist of a single method blank, laboratory control sample (LCS) and one set of matrix spike/spike duplicates. In the event of a re-extraction, only the method blank and LCS will be analyzed due to limited sample volume. All samples will minimally receive a surrogate spike including method QC samples. Control limits will be in accordance with established in-house limits as required under the laboratory SOPs, the lab QA Manual and their TNI accreditation (EPA Region 10, 2015). Results of sample and method QC will be reported with the data. Statistical calculations for method QC are identified in section A7.

## **B6. Instrument/ Equipment Testing, Inspection, and Maintenance Requirements**

Analytical laboratory equipment testing, inspection and maintenance adheres to strict requirements as prescribed by the lab's QA Manual and as required in order to meet their TNI accreditation. An initial demonstration of capability (IDOC) is performed and verified on each method prior to approval for implementation. Service agreements assure the availability of reliable instrumentation at the time the analysis is requested.

## **B7. Instrument Calibration and Frequency**

For PCB analysis laboratory instrumentation will be calibrated within the lab's SOP and method requirements prior to the analysis of project sample extracts (EPA Region 10, 2015). Analytical balances and drying ovens are routinely calibrated and monitored for performance as part of the lab's internal quality control program. Instrument calibration records shall be maintained and be traceable to the instrument. These records will be archived in hardcopy format with the analytical data package.

## **B8. Inspection/ Acceptance Requirements for Supplies and Consumables**

Sample bottles for this split sampling effort will be certified clean and provided by MEL. Sample coolers, custody seals and custody forms will be provided by the MEL warehouse and/or the RSCC. USACE field staff will maintain field logbooks for recording observations. Sample containers will be initially labelled with sample labels and that caps marked in indelible ink utilizing a lab sharpie.

## **B9. Data Acquisition Requirements (Non-Direct Measurements)**

Additional data acquisition for this project consists of sample and/or site related information that is reported by the PRPs. This would consist of GPS locations of sample cores and the PRP PCB results.

Table 5 contains the original sediment core locations (in State Plane) in addition to the equivalent decimal degree format values (required for Scribe). EPA split sample PCB results will be compared to the PRP sample data.

## **B10. Data Management**

Critical data for this project will consist of field observations, sample identification information (PRP location and sample IDs) and PCB sample results. Field logbooks will be maintained by the USACE and the information reported to the EPA RPM. Project code, sample identifiers and PCB Aroclor results will be housed in Scribe and archived to Scribe.net at project completion. All supportive laboratory documentation will be kept at MEL in hardcopy format until archived to the federal records center. Prior to final release an independent check of the laboratory results will be performed internal to the laboratory.

## **Part C - Assessment and Oversight**

### **C1. Assessments and Response Actions**

No formal assessments or oversight activities are planned for this project. Sample identification information will be checked and verified for legibility and correctness at the time of sample transfer. Assessments of laboratory performance are performed as part of routine QC checks and internal data reviews. MEL also undergoes external audits in accordance with their NELAC accreditation requirements and to maintain accreditation status.

Non-conformances internal to the lab are addressed during independent review and error checking. In the event of non-compliant QC, re-extraction and analysis for PCBs would be implemented in consultation with laboratory management. Method excursions for handling problem matrices would require concurrence from the RPM.

### **C2. Reports to Management**

Laboratory audits and performance evaluation results are a matter of record and maintained by the laboratory QA Coordinator and laboratory director. Passing ongoing performance tests is a requirement for prior to proceeding with laboratory analysis. Upon failure of a performance test, analysis cannot be performed until a corrective action has been completed, the problem is corrected and the performance test repeated to demonstrate issue resolution. Corrective actions are maintained by the laboratory QA Coordinator. For split sample collection there may be occurrences where samples cannot be collected

or alternative samples are required. In the event of sample loss a Corrective Action Form (appendix B) will be filled out and approved. For alternate samples a Sample Plan Alteration Form is used (appendix A). Both forms are submitted to the EPA RPM and Project QA Staff for review and approval.

## **Part D - Data Validation and Usability**

### **D1. Data Review, Validation, and Verification Requirements**

As part of their laboratory QA manual, prior to its release, data at MEL undergo an internal review and verification after which data qualifiers may be applied. This review consists of a check against all required QC results and a spot check of the analytical results against the raw data. This review is performed by an independent peer who is experienced in the analysis in addition to a supervisory review. The final data is accompanied by a data review report and batch level QC results.

### **D2. Validation and Verification Methods**

Data review and verification on MEL analytical results is commensurate with a stage 4 validation (S4VM) as defined in 2009 EPA Data Validation Labelling Guidance (EPA 540-R-08-005) for Superfund use. This level of review is performed on 100% of the data packages prior to their authorization for release.

### **D3. Reconciliation with User Requirements**

Reported PCB results will be evaluated against the cleanup standard to determine that the sensitivity requirements were achieved for all analysis. Data quality issues identified by the lab will be communicated to the RPM and evaluated to determine if there is a significant impact to data use or comparison to either the PRP data or the cleanup standards.

**Table 3. Analysis & Project Quality Objectives**

Analysis	Matrix	Method	Criteria	Required Method Reporting Limit	Precision <sup>1</sup>	Accuracy <sup>2</sup>	Completeness
PCB Aroclors	Sediment	3540 or 3541 / 8082A	12 mg/Kg (OC)	0.06 mg/Kg (DW) <sup>3</sup>	± 50% RPD	50-150%	100%
Moisture Content	Sediments	ASTM D2216	--	0.1%	--	--	100%

DW – PCBs will be reported by the lab on a dry weight basis.

<sup>1</sup> As measured by MS/MSD recoveries. LCS recoveries will follow established acceptance criteria and will be noted in the labs data report.

<sup>2</sup> As measured by matrix spike recoveries. Surrogate recoveries will follow established laboratory control limits and will be noted in the labs data report.

<sup>3</sup> Estimated minimum reporting limit based on one half the cleanup criteria and a 1% TOC content.

**Table 4. Number of Field Samples, Preservation & Holding Times**

Analysis / Method	Matrix	# of Field Samples	# of Field Blank Samples	# of Field Duplicate Samples	# of DU/MS or MS/MSD Samples	Containers <sup>2</sup>	Preservation	Total # of Samples <sup>1</sup>	Holding Time <sup>3</sup>
PCB Aroclors	Sediments	21	0	0	0	8 oz wide mouth glass	Freeze - 18°C	21	2 years for extraction; 40 days for analysis
Moisture Content	Sediments	21	0	0	0	8 oz wide mouth glass	Freeze - 18°C	21	None

<sup>1</sup> Total # of samples is an anticipated estimate (possible 4-7) based on the success of core collection and includes all samples plus field QA samples. Does not include MS/MSD designated samples which can be removed from the same parent sample jar.

<sup>2</sup> A single 8 oz container is sufficient for both PCB Aroclor and Moisture Content analyses.

<sup>3</sup> While EPA Method 8082A does no longer indicate a holding time or temperature requirement for PCB Aroclors, preservation temperature and holding times identified here are the same as in the PRP QAPP (Anchor QEA, 2015) for consistency.

## REFERENCES CITED

Anchor QEA, 2015, *Construction Quality Assurance Plan – Modification No. 1, Jorgensen Forge Early Action Removal Action*, Prepared for USEPA on behalf of Earl M. Jorgensen Company, July 2015

EPA 240-R-02-009, *Guidance for Quality Assurance Project Plans*, EPA QA/G-5, December, 2002

EPA 540-R-08-005, *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use*, EPA OSWER No. 9200.1-85, January 13, 2009

EPA Region 10, 2014, *Data Management Plan for Environmental Monitoring and Associated Geospatial Data*, Appendix H, EPA Region 10 Quality Management Plan, January, 2014

EPA Region 10, 2015, *Quality Assurance Manual for the U.S. EPA Region 10 Environmental Laboratory*, April, 2015

**Table 5. Sediment Sample Locations**

Location ID	Decimal Degrees		Washington State Plane (North Zone) <sup>1</sup>	
	Latitude	Longitude	Northing	Easting
PDS-1	47.5267204	-122.3090750	195627.7	1275837.8
PDS-2	47.5264060	-122.3089875	195512.6	1275857.2
PDS-3	47.5262803	-122.3088221	195466.0	1275897.2
PDS-4	47.5258506	-122.3089334	195309.8	1275866.7
PDS-5	47.5260230	-122.3086241	195371.2	1275944.3
PDS-6	47.5254979	-122.3086845	195180.0	1275925.7
PDS-7	47.5271509	-122.3093556	195786.0	1275771.5

<sup>1</sup> State Plane coordinates derived from (Anchor QEA, 2015)

Note: Sediment cores from each location will represent the 0-1', 1-2' and 2-3' (foot) depths within the Z-layer (21 samples total).

## Appendix A - Sample Plan Alteration Form

Project Name and Number: \_\_\_\_\_

Material to be sampled: \_\_\_\_\_  
\_\_\_\_\_

Measurement Parameter: \_\_\_\_\_  
\_\_\_\_\_

Standard Procedure for Field Collection & Laboratory Analysis (cite reference):  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reason for Change in Field Procedure or Analysis Variation:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Variation from Field or Analytical Procedure:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Special Equipment, Materials or Personnel Required:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Initiators Name: \_\_\_\_\_ Date: \_\_\_\_\_

EPA RPM: \_\_\_\_\_ Date: \_\_\_\_\_

EPA QA Staff: \_\_\_\_\_ Date: \_\_\_\_\_

## Appendix B - Corrective Action Form

Project Name and Number: \_\_\_\_\_

Sample Dates Involved: \_\_\_\_\_

Measurement Parameter: \_\_\_\_\_

Acceptable Data Range: \_\_\_\_\_

Problem Areas Requiring Corrective Action:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Measures Required to Correct Problem:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Means of Detecting Problems and Verifying Correction:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Initiators Name: \_\_\_\_\_ Date: \_\_\_\_\_

EPA RPM: \_\_\_\_\_ Date: \_\_\_\_\_

EPA QA Staff: \_\_\_\_\_ Date: \_\_\_\_\_